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Please add new claims 40-81.

40. (New) A method for determining the identity of a specific nucleotide at a defined site in a target nucleic acid polymer, comprising the steps of:

- (a) providing a detectable amount of a target nucleic acid polymer in a single stranded form;
- (b) hybridizing the detectable amount of the nucleic acid polymer with an oligonucleotide primer, wherein the primer has a nucleotide sequence that is complementary to a sequence in the target nucleic acid polymer, such that when the primer is hybridized to the target nucleic acid polymer the 3' end of the primer binds to a nucleotide flanking the specific nucleotide at the defined site in the target nucleic acid;
- (c) exposing the hybridized nucleic acid polymer to a polymerization agent in a mixture containing at least one deoxynucleotide and a chain terminating nucleotide analogue, such that a detectable primer extension product comprising a labeling moiety is formed if the chain terminating nucleotide analogue is not complementary to the defined site, and
- (d) analyzing the polymerization mixture of step (c) for the presence or absence of the primer extension product containing the labeling moiety at the 3' end thereof, whereby the identity of the specific nucleotide at the defined site is determined.

41. (New) A method according to claim 40, wherein the moiety is a polynucleotide.

42. (New) A method according to claim 40, wherein the mixture of step (c) comprises at least two deoxynucleotides each comprising a different base.

43. (New) A method according to claim 40, wherein the primer hybridizes to the target nucleic acid immediately adjacent the specific nucleotide being identified.

44. (New) A method according to claim 40, wherein the detectable amount of target nucleic acid polymer is obtained by performing an amplification reaction.

45. (New) A method according to claim 40, wherein the one or more deoxynucleotides are deoxynucleoside triphosphates selected from the group consisting of dATP, dGTP, dCTP and dTTP.

46. (New) A method according to claim 40, wherein the chain terminating nucleotide analogue is selected from group consisting of ddATP, ddGTP, ddCTP and ddTTP.

47. (New) A method according to claim 40, wherein the polymerization agent is a DNA polymerase.

48. (New) A method according to claim 40, wherein the primer extension product is removed from the target nucleic acid prior to analysis.

49. (New) A method according to claim 40 or 41, wherein a plurality of specific nucleotides may be detected at different defined sites in one or more target nucleic acid polymers by hybridizing a plurality of oligonucleotide primers to complementary sequences in the one or more target nucleic acid polymers flanking each site and extending the primers to form distinguishable extended primers.

50. (New) A method according to claim 40, wherein the target nucleic acid is obtained or derived from the cells of a patient and the detection of the specific nucleotide indicates predisposition to a genetic disease in the patient.

51. (New) A method for determining the identity of a specific nucleotide at a defined site in a target nucleic acid polymer, comprising the steps of:

- (a) providing a detectable amount of a target nucleic acid polymer in a single stranded form;
- (b) hybridizing the detectable amount of the nucleic acid polymer with an oligonucleotide primer, wherein the primer has a nucleotide sequence that is complementary to a sequence in the target nucleic acid polymer, such that when the primer is hybridized to the target nucleic acid polymer the 3' end of the primer binds to a nucleotide flanking the specific nucleotide at the defined site in the target nucleic acid;
- (c) exposing the hybridized nucleic acid polymer to a polymerization agent in a mixture containing at least one deoxynucleotide and a chain terminating nucleotide analogue, such that a detectable primer extension product is formed which differs depending upon whether the chain terminating nucleotide analogue is complementary or not complementary to the defined site, and
- (d) analyzing the polymerization mixture of step (c) for the primer extension product, whereby the identity of the specific nucleotide at the defined site is determined.

52. (New) A method according to claim 51, wherein the mixture of step (c) comprises at least two deoxynucleotides each comprising a different base.

53. (New) A method according to claim 51, wherein the primer hybridizes to the target nucleic acid immediately adjacent the specific nucleotide being identified.

54. (New) A method according to claim 51, wherein the detectable amount of target nucleic acid polymer is obtained by performing an amplification reaction.

55. (New) A method according to claim 51, wherein the one or more deoxynucleotides are deoxynucleoside triphosphates selected from the group consisting of dATP, dGTP, dCTP and dTTP.

56. (New) A method according to claim 51, wherein the chain terminating nucleotide analogue is selected from group consisting of ddATP, ddGTP, ddCTP and ddTTP.

57. (New) A method according to claim 51, wherein the polymerization agent is a DNA polymerase.

58. (New) A method according to claim 51, wherein the primer extension product is removed from the target nucleic acid prior to analysis.

59. (New) A method according to claim 51 or 52, wherein a plurality of specific nucleotides may be detected at different defined sites in one or more target nucleic acid polymers by hybridizing a plurality of oligonucleotide primers to complementary sequences in the one or more target nucleic acid polymers flanking each site and extending the primers to form distinguishable extended primers.

60. (New) A method according to claim 51, wherein the target nucleic acid is obtained or derived from the cells of a patient and the detection of the specific nucleotide indicates predisposition to a genetic disease in the patient.

61. (New) A method for determining the identity of a specific nucleotide at a defined site in a target nucleic acid polymer, comprising the steps of:

- (a) providing a detectable amount of a target nucleic acid polymer in a single stranded form;
- (b) hybridizing the detectable amount of the nucleic acid polymer with an oligonucleotide primer, wherein the primer has a nucleotide sequence that is complementary to a sequence in the target nucleic acid polymer, such that when the primer is hybridized to the target nucleic acid polymer the 3' end of the primer binds to a nucleotide flanking the specific nucleotide at the defined site in the target nucleic acid;
- (c) exposing the hybridized nucleic acid polymer to a polymerization agent in a mixture containing at least one deoxynucleotide and more than one chain terminating nucleotide analogue, such that a detectable primer extension product comprising a labeling moiety is formed if none of the chain terminating nucleotide analogues are not complementary to the defined site, and
- (d) analyzing the polymerization mixture of step (c) for the presence or absence of the primer extension product containing the labeling moiety at the 3' end thereof, whereby the identity of the specific nucleotide at the defined site is determined.

62. (New) A method according to claim 61, wherein the moiety is a polynucleotide.

63. (New) A method according to claim 61, wherein the mixture of step (c) comprises at least two deoxynucleotides each comprising a different base.

64. (New) A method according to claim 61, wherein the primer hybridizes to the target nucleic acid immediately adjacent the specific nucleotide being identified.

65. (New) A method according to claim 61, wherein the detectable amount of target nucleic acid polymer is obtained by performing an amplification reaction.

66. (New) A method according to claim 61, wherein the one or more deoxynucleotides are deoxynucleoside triphosphates selected from the group consisting of dATP, dGTP, dCTP and dTTP.

67. (New) A method according to claim 61, wherein the chain terminating nucleotide analogue is selected from group consisting of ddATP, ddGTP, ddCTP, ddTTP and complements thereof.

68. (New) A method according to claim 61, wherein the polymerization agent is a DNA polymerase.

69. (New) A method according to claim 61, wherein the primer extension product is removed from the target nucleic acid prior to analysis.

70. (New) A method according to claim 61 or 62, wherein a plurality of specific nucleotides may be detected at different defined sites in one or more target nucleic acid polymers by hybridizing a plurality of oligonucleotide primers to complementary sequences in the one or more target nucleic acid polymers flanking each site and extending the primers to form distinguishable extended primers.

71. (New) A method according to claim 61, wherein the target nucleic acid is obtained or derived from the cells of a patient and the detection of the specific nucleotide indicates predisposition to a genetic disease in the patient.

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72. (New) A method for determining the identity of a specific nucleotide at a defined site in a target nucleic acid polymer, comprising the steps of:

- (a) providing a detectable amount of a target nucleic acid polymer in a single stranded form;
- (b) hybridizing the detectable amount of the nucleic acid polymer with an oligonucleotide primer, wherein the primer has a nucleotide sequence that is complementary to a sequence in the target nucleic acid polymer, such that when the primer is hybridized to the target nucleic acid polymer the 3' end of the primer binds to a nucleotide flanking the specific nucleotide at the defined site in the target nucleic acid;
- (c) exposing the hybridized nucleic acid polymer to a polymerization agent in a mixture containing at least one deoxynucleotide and more than one chain terminating nucleotide analogue, such that a detectable primer extension product is formed which differs depending upon whether one of the chain terminating nucleotide analogues is complementary to the defined site or none of the chain terminating nucleotide analogues is complementary to the defined site, and
- (d) analyzing the polymerization mixture of step (c) for the primer extension product, whereby the identity of the specific nucleotide at the defined site is determined.

73. (New) A method according to claim 72, wherein the mixture of step (c) comprises at least two deoxynucleotides each comprising a different base.

74. (New) A method according to claim 72, wherein the primer hybridizes to the target nucleic acid immediately adjacent the specific nucleotide being identified.

75. (New) A method according to claim 72, wherein the detectable amount of target nucleic acid polymer is obtained by performing an amplification reaction.

76. (New) A method according to claim 72, wherein the one or more deoxynucleotides are deoxynucleoside triphosphates selected from the group consisting of dATP, dGTP, dCTP and dTTP.

77. (New) A method according to claim 72, wherein the chain terminating nucleotide analogue is selected from group consisting of ddATP, ddGTP, ddCTP, ddTTP and complements thereof.

78. (New) A method according to claim 72, wherein the polymerization agent is a DNA polymerase.

79. (New) A method according to claim 72, wherein the primer extension product is removed from the target nucleic acid prior to analysis.

80. (New) A method according to claim 72 or 73, wherein a plurality of specific nucleotides may be detected at different defined sites in one or more target nucleic acid polymers by hybridizing a plurality of oligonucleotide primers to complementary sequences in the one or more target nucleic acid polymers flanking each site and extending the primers to form distinguishable extended primers.

81. (New) A method according to claim 72, wherein the target nucleic acid is obtained or derived from the cells of a patient and the detection of the specific nucleotide indicates predisposition to a genetic disease in the patient.